

PB-229 803

GLOSSARY OF AQUATIC ECOLOGICAL TERMS

ENVIRONMENTAL PROTECTION AGENCY

FEBRUARY 1972



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GLOSSARY OF AQUATIC ECOLOGICAL TERMS

compiled by

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**NATIONAL TECHNICAL
INFORMATION SERVICE**
U.S. Department of Commerce
Springfield, VA. 22151

Manpower Development Branch
Air and Water Programs Division
Region VI
Environmental Protection Agency
Ada, Oklahoma 74820
September 1969
Revised
February 1972

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PREFACE

This Glossary is intended to provide familiarity and understanding of technical terminology specific to the discipline of aquatic ecology and will serve as a convenient reference for all professionally trained persons concerned with water pollution control.

Definitions have been carefully reviewed to assure accord with current professional usage. Appreciation is tendered to biologists of the following Environmental Protection Agency activities for this service: Robert S. Kerr Water Research Center, Ada, Oklahoma; National Field Investigations Center, National Training Center, Analytical Quality Control Laboratory, Cincinnati, Ohio; National Water Quality Laboratory, Duluth, Minnesota; National Marine Water Quality Laboratory, West Kingston, Rhode Island.

Terms specifically identifying or describing organisms have generally been excluded from this work. For this information the reader is referred to the selected references presented in the appendix. Glossaries of terminology related to other disciplines concerned with water pollution control are also listed in the appendix.

Terms underscored in a definition are separately defined in this Glossary. Where appropriate, closely associated or related terms are cited parenthetically, (See), following the definition. Specific synonyms are noted, in parentheses, with the listed word.

John E. Matthews

ABYSSAL ZONE	All of a sea, or a very deep lake below the <u>bathyal zone</u> . The primary energy source for this region lies far above in the <u>euphotic zone</u> ; density of life depends on the amount of organic material that settles from the <u>euphotic zone</u> . (See <u>Hadal Zone</u>)
ACCLIMATION	Physiological and behavioral adjustments of an organism in response to a change in environment. (See <u>Adaptation</u>)
ACCLIMATIZATION	<u>Acclimation</u> of a particular species over several generations in response to marked environmental changes.
ACUTE TOXICITY	Any toxic effect that is produced within a short period of time, usually 24-96 hours. Although the effect most frequently considered is mortality, the end result of acute toxicity is not necessarily death. Any harmful biological effect may be the result. (See <u>Chronic Toxicity</u> , <u>Direct Toxicity</u>)
ACTINOMYCETES	Filamentous microorganisms intermediate between the fungi and bacteria, although more closely related to the bacteria. These organisms are widely distributed in soils and are often conspicuous in lake and river muds. They are often associated with taste and odor problems in water supplies.

ADAPTATION

Change in the structure, form or habits of an organism to better fit changed or existing environmental conditions. (See Acclimation)

AEROBIC

Refers to life or processes occurring only in the presence of free oxygen; refers to a condition characterized by an excess of free oxygen in the aquatic environment. (See Anaerobic)

ALGAE (Alga)

Simple plants, many microscopic, containing chlorophyll. Algae form the base of the food chain in aquatic environments. Some species may create a nuisance when environmental conditions are suitable for prolific growth.

ALLOCHTHONOUS

Pertaining to those substances, materials or organisms in a waterway which originate outside and are brought into the waterway. (See Autochthonous)

ALLUVIAL

Pertaining to material that is transported and deposited by running water.

ALLUVIAL FAN

(Delta)

ANABOLISM

Synthesis or manufacture of organic compounds within an organism. (See Metabolism)

ANADROMOUS	Pertaining to fishes that spend most of their life in salt water but enter freshwater to <u>spawn</u> ; e.g., salmon, shad, striped bass, etc. (See <u>Catadromous</u>)
ANAEROBIC	Refers to life or processes occurring in the absence of free oxygen; refers to conditions characterized by the absence of free oxygen. (See <u>Aerobic</u>)
ANTAGONISM	Reduction of the effect of one substance because of the introduction or presence of another substance; e.g., one substance may hinder, or counteract, the toxic influence of another. (See <u>Synergism</u>)
APHOTIC ZONE	That portion of a body of water to which light does not penetrate with sufficient intensity to have any biological significance. (See <u>Euphotic Zone</u>)
AQUATIC VASCULAR PLANTS	(<u>Higher Aquatic Plants</u>)
ARTIFICIAL SUBSTRATE	A device placed in the water (for a specified <u>period of time</u>) that provides living spaces for a multiplicity of organisms; e.g., glass slides, concrete blocks, multiplate samplers, rock baskets, etc. The primary purpose of artificial substrates is to allow the investigator to collect organisms in areas where the physical habitat is limiting or cannot be adequately sampled using conventional methods.

ASSIMILATION	1. Removal of dissolved or suspended materials from a water mass by biological, chemical and physical processes; 2. Conversion or incorporation of absorbed nutrients into body substances. (See <u>Synthesis</u>)
ASSOCIATION	All organisms occupying a given <u>habitat</u> .
ATOLL	Large, thick, <u>coral</u> mass encircling a <u>lagoon</u> in tropical oceans; sometimes portions of the <u>reef</u> become built up with sand, silt, soil and vegetation to become an island. (See <u>Barrier Reef</u> , <u>Fringing Reef</u>)
AUFWUCHS	(<u>Periphyton</u>)
AUTOCHTHONOUS	Pertaining to those substances, materials, or organisms originating within a particular waterway and remaining in that waterway. (See <u>Allochthonous</u>)
AUTOTROPHIC (Holophytic)	Self nourishing; denoting those organisms that do not require an external source of organic material but can utilize light energy and manufacture their own food from inorganic materials; e.g., green plants, pigmented flagellates. (See <u>Heterotrophic</u>)

BACTERIA	Microscopic, single-celled or noncellular plants, usually saprophytic or parasitic.
BARRIER BEACH	A ridge of deposits separated from the mainland by an interval of water.
BARRIER REEF	Large, thick, <u>coral</u> mass more or less surrounding an island or paralleling the mainland shore in tropical areas; separated from the land mass by a lagoon. (See <u>Atoll</u> , <u>Fringing Reef</u>)
BATHYAL ZONE	That region of the sea that extends from the <u>euphotic zone</u> to the bottom of the <u>continental slope</u> . Density of life in this zone depends on organic material settling from the <u>euphotic zone</u> and is generally inversely proportional to the depth.
BEACH	The zone of demarcation between land and water of lakes, seas, etc.; covered by sand, gravel or larger rock fragments.
BENTHIC REGION	The bottom of a waterway; the substratum that supports the <u>benthos</u> .

BENTHOS

Organisms growing on or associated principally with the bottom of waterways. These include: (1) sessile animals such as sponges, barnacles, mussels, oysters, worms, and attached algae; (2) creeping forms such as snails, worms and insects; (3) burrowing forms, which include clams, worms, and some insects; and (4) fish whose habits are more closely associated with the benthic region than other zones; e.g., flounders.

BIOASSAY

A determination of the biological effect of some substance, factor or condition employing living organisms or cells as the indicator.

BIOCOENOSIS

The plants and animals comprising a community.

BIOLOGICAL
CONTROL

1. Use of natural predators, parasites or viruses to reduce or eliminate pest organisms; e.g., use of gambusia to feed on mosquito larvae;
2. Control of organisms by interference with their physiological processes; e.g., sterilization of male flies.

BIOLOGICAL
MAGNIFICATION

The ability of certain organisms to remove from the environment and store in their tissues substances present at nontoxic levels in the surrounding water. The concentration of these substances becomes greater each higher step in the food chain. (See Enrichment Factor)

BIOMASS	The total amount of living material in a given <u>habitat</u> or area; or, an expression dealing with the total weight of a given <u>population</u> of organisms.
BIOMONITORING	<ol style="list-style-type: none">1. Continuous surveillance of an effluent (or dilution thereof) by using living organisms to test its suitability for discharge into a receiving water.2. Use of living organisms to test the quality of a receiving water downstream from a waste discharge. (See <u>Bioassay</u>)
BIOSTIMULATION	A general term used to describe the complex set of factors involved in the growth of algae (and other organisms) in a receiving water due to the addition of nutrients.
BIOTA	All life of a region.
BIOTIC FACTORS (Biological Factors)	In <u>ecology</u> , those environmental factors which are the result of living organisms and their activities; distinct from physical and chemical factors; e.g., <u>competition</u> , predation, etc. (See <u>Ecological Factor</u>)
BIOTIC POTENTIAL	The inherent capability of an animal to multiply in an unrestricted <u>environment</u> . (See <u>Environmental Resistance</u>)

BIOTOPE

(Habitat)

BLOODWORMS

Midge fly larvae. Many of the species have hemoglobin in the blood causing a red color and are often associated with rich organic deposits. Also, the common name for certain of the marine segmented worms (class Polychaeta). (See Sludgeworms)

BLOOM

A readily visible concentrated growth or aggregation of minute organisms, usually algae, in bodies of water.

BRACKISH WATERS

Those areas where there is a mixture of fresh and salt water; or, the salt content is greater than fresh water but less than sea water; or, the salt content is greater than in sea water.

CARNIVOROUS	Pertaining to animals that feed on other animals. (See <u>Herbivorous</u>)
CARRYING CAPACITY	The maximum quantity of organisms that any particular <u>habitat</u> can support over an extended period.
CATABOLISM	The breakdown of organic compounds within an organism. (See <u>Metabolism</u>)
CATADROMOUS	Pertaining to fish that spend most of their life in freshwaters; but migrate to the sea to <u>spawn</u> ; e.g., american eel. (See <u>Anadromous</u>)
CATASTROPHIC DRIFT	Massive drift of bottom organisms under conditions of stress such as floods or <u>toxicity</u> . (See <u>Drift Organisms</u> , <u>Incidental Drift</u> , <u>Periodic Drift</u>)
CHEMICAL STRATIFICATION	A layering of water in a lake because of <u>density</u> differences owing to the varying or differential concentrations of dissolved substances with depth. (See <u>Stratification</u>)
CHLOROPHYLL	Green photosynthetic pigment present in many plant and some bacterial cells. There are seven known types of chlorophyll; their presence and abundance vary from one group of photosynthetic organisms to another.

CHRONIC TOXICITY

Toxicity, marked by a long duration, that produces an adverse effect on organisms. The end result of chronic toxicity can be death although the usual effects are sublethal; e.g., inhibits reproduction, reduces growth, etc. These effects are reflected by changes in the productivity and population structure of the community. (See Acute Toxicity)

CLASSIFICATION

The placing of organisms into groups (or categories) according to established scientific requirements. (See Taxonomy)

CLEAN WATER
ASSOCIATION

An association of organisms found in any natural, unpolluted environment. These associations are characterized by the presence of species that are sensitive to environmental changes caused by introduction of pollutants. In many cases the presence of a wide variety of species with relatively few individuals representing any one of them is also a characteristic. (See Sensitive Organisms, Tolerant Association)

COASTAL PLAIN

A plain between the sea and higher land, usually at a low elevation.

COASTAL WATERS

Those waters surrounding the continent which exert a measurable influence on uses of the land and on its ecology. The Great Lakes and the waters to the edge of the continental shelf.

COASTAL ZONE

Coastal waters and adjacent lands which exert a measurable influence on the uses of the sea and its ecology. The zone extends onshore to the upper reaches of the tidal zone and adjacent shore areas. (See Estuary)

COLD-BLOODED ANIMALS

Animals that lack an internal temperature regulating mechanism to offset external temperature changes. Their body temperature fluctuates to a large degree with that of their environment. Examples are fish and aquatic invertebrates.

COLONY

A distinguishable localized population within a species.

COMMUNITY

An aggregation of organisms within a specified area; all forms of life inhabiting a common environment.

COMPENSATION LEVEL

The depth of a waterway at which there is a balance between photosynthesis and respiration.

COMPETITION

The effort of two or more individuals or species of a community to utilize some of the same environmental resources.

COMPETITION EXCLUSION PRINCIPLE
(Gause's Rule)

No two species can occupy the same niche at the same time.

CONSUMERS

Heterotrophic organisms, chiefly animals, that ingest other organisms or particle organic matter. Often divided into primary consumers (Herbivores), secondary consumers (Carnivores which eat primary consumers), etc. (See Heterotrophic, Trophic Level)

CONTINENTAL SHELF

The shallow, gently sloping portion of the seabottom bordering a continent, down to a depth of about 200 meters.

CONTINENTAL SLOPE

The steeply sloping portion of the seabottom extending seaward from the continental shelf.

CORAL

A marine member of the phylum Coelenterata which secretes a hard exoskeleton, chiefly of calcium carbonate.

CORAL REEF

Large coral mass associated with coastal areas in the tropics (See Barrier Reef, Fringing Reef, Atoll)

CRITERIA

(Water Quality Criteria)

CRITICAL LEVEL

(Threshold)

CRITICAL RANGE

In bioassays, the range of magnitude of any factor between the maximum level or concentration at which no organisms die to the minimum level or concentration at which all organisms die under a given set of conditions in a given period of time.

CULTURAL
EUTROPHICATION

Acceleration by man of the natural process of
enrichment (aging) of bodies of water.

CULTURE

Cultivation of organisms in a medium containing
necessary nutrients.

DECOMPOSERS

(Reducers)

DELTA
(Alluvial Fan)

A fan-shaped deposition of silt, sand, gravel or other fine materials from a stream. These occur when the hydraulic gradient lessens abruptly, as in the discharge of a stream into a lake, or a river into an ocean.

(See Alluvial)

DENSITY
(Population
Species)

The number of individuals in relation to the space in which they occur; refers to the closeness of individuals to one another at a given time.

DENSITY
STRATIFICATION

(Stratification)

DEPOSITING
SUBSTRATES

Bottom areas where solids are being actively deposited because of slackening movement of the transporting agent. These often occur in the vicinity of effluent discharges.

(See Sludge Deposits)

DETRITUS

Fragments of detached or broken down material.

DIRECT TOXICITY

Toxicity that has an effect on organisms themselves instead of having an effect by alteration of their habitat or interference with their food supply. (See Acute Toxicity, Chronic Toxicity, Indirect Toxicity)

DIURNAL

1. Refers to an event, process, or specific change that occurs every day; usually associated with changes from day to night.
2. Pertaining to those organisms that are active during day time. (See Nocturnal)

DIVERSITY

Pertaining to the variety of species within a given association of organisms. Areas of high diversity are characterized by a great variety of species; usually relatively few individuals represent any one species. Areas with low diversity are characterized by a few species; often relatively large numbers of individuals represent each species.

DOMINANT SPECIES

Species of a community which by their activity, behavior, or number, have considerable influence or control upon the conditions of existence of associated species; species which "controls" its habitat and food web. (See Predominant)

DRIFT ORGANISMS

Benthic organisms temporarily suspended in the water and carried downstream by the current. (See Incidental Drift, Periodic Drift, Catastrophic Drift)

DYSTROPHIC LAKES

Shallow lakes with brown water, high humic material and organic matter content, low nutrient availability, poor bottom fauna, and high oxygen demand; oxygen is continually depleted and pH is usually low. In lake aging the "age" between a eutrophic lake and a swamp.

EBB TIDE	That period of <u>tide</u> between a high water and the succeeding low water; falling tide. (See <u>Flood Tide</u>)
EC ₅₀	Concentration of a substance producing 50% decrease in shell growth.
ECOLOGICAL FACTOR	Any part or condition of the <u>environment</u> that influences the life of one or more organisms. (See <u>Biotic Factor</u>)
ECOLOGICAL NICHE	The role of an organism in an <u>ecosystem</u> , its activities and relationships to the living and nonliving environment; food and nutrition relationships are of primary importance. (See <u>Habitat Niche</u>)
ECOLOGY	Interrelationships between <u>organisms</u> and their <u>environment</u> .
ECOSYSTEM	A <u>community</u> , including all the component organisms, together with the <u>environment</u> , forming an interacting system.
ECOTYPE (Habitat Form)	A locally adapted population of a species which has a distinctive limit of tolerance to <u>environmental</u> factors. (Individuals of the same <u>species</u> may appear different in various <u>habitats</u>).

EMERSED (Emergent) AQUATIC PLANTS	Plants that are rooted at the bottom of a body of water, but project above the surface; e.g., cattails, bulrushes, etc. (See <u>Floating Aquatic Plants</u> , <u>Submersed Aquatic Plants</u>)
ENRICHMENT	An increase in the quantity of <u>nutrients</u> available to aquatic organisms for their growth. (See <u>Eutrophication</u>)
ENRICHMENT FACTOR	Number of times a substance is concentrated in the tissue of an organism over the concentration in its environment. (See <u>Biological Magnification</u>)
ENVIRONMENT	All external influences and conditions affecting the life and development of an organism or <u>community</u> .
ENVIRONMENTAL RESISTANCE	Restriction imposed on the numerical increase of a <u>population</u> by environmental factors. (See <u>Biotic Potential</u>)
EPILIMNION	The water mass extending from the surface to the <u>thermocline</u> in a stratified body of water; the epilimnion is less dense than the lower waters and is wind-circulated and essentially <u>homothermous</u> . (See <u>Hypolimnion</u>)
EQUILIBRIUM	The condition in which a <u>population</u> or <u>community</u> is maintained with only minor fluctuations in composition over an extended period of time.

ESTUARY	That portion of a coastal stream influenced by the <u>tide</u> of the body of water into which it flows; a bay, at the mouth of a river, where the tide meets the river current; an area where fresh and marine waters mix. (See <u>Positive Estuary</u> , <u>Inverse Estuary</u> , <u>Neutral Estuary</u> , <u>Coastal Zone</u>)
EULITTORAL ZONE	(<u>Tidal Zone</u>)
EUPHOTIC ZONE	The lighted region of a body of water that extends vertically from the water surface to the depth at which <u>photosynthesis</u> fails to occur because of insufficient light penetration.
EURY-	Prefix meaning wide; e.g., euryhaline refers to a wide range of salinity tolerance; eurythermal refers to a wide range of temperature tolerance. (See <u>Steno-</u>)
EUTROPHIC LAKES	Lakes which are rich in <u>nutrients</u> and organic materials, therefore, highly productive. These lakes are often shallow and seasonally deficient of oxygen in the <u>hypolimnion</u> . (See <u>Oligotrophic Lakes</u>)

EUTROPHICATION

The natural process of the maturing (aging) of a lake; the process of enrichment with nutrients, especially nitrogen and phosphorus, leading to increased production of organic matter. (See Cultural Eutrophication, Oligotrophic Lakes, Eutrophic Lakes)

FALCULTATIVE	Refers to the capability of an organism to live under varying conditions; e.g., a facultative <u>anaerobe</u> is an organism that although usually living in the presence of free oxygen can live in the absence of free oxygen. (See <u>Obligate</u>)
FALL OVERTURN	A physical phenomenon that may take place in a body of water during early autumn. The sequence of events leading to fall overturn include: (1) cooling of surface waters, (2) density change in surface waters producing convection currents from top to bottom, (3) circulation of the total water volume by wind action, and (4) vertical temperature equality. The <u>overtturn</u> results in a uniformity of the physical and chemical properties of the entire water mass. (See <u>Spring Overtturn</u>)
FATHOM	A unit of measurement equal to 6 feet (1.83 meters).
FAUNA	Animal life.
FIRTH	A narrow arm of the sea; also the opening of a river into the sea. (See <u>Estuary</u>)
FJORD (Fiord)	A narrow arm of the sea between highlands. (See <u>Firth</u> , <u>Estuary</u>)

FLOATING AQUATIC PLANTS	Rooted plants that wholly or in part float on the surface of the water; e.g., water lilies, water hyacinth and duckweed. (See <u>Emersed Aquatic Plants</u> , <u>Submersed Aquatic Plants</u>)
FLOOD TIDE	That period of <u>tide</u> between low water and the succeeding high water; a rising tide. (See <u>Ebb Tide</u>)
FLORA	Plant life.
FLUVIAL	Of or pertaining to rivers; growing or living in streams; produced by river action, as a fluvial plain.
FOOD CHAIN	Dependence of a series of organisms, one upon the other, for food. The chain begins with plants and ends with the largest carnivores; e.g., <u>phytoplankton</u> → <u>zooplankton</u> → <u>forage fish</u> → <u>game fish</u> .
FOOD CYCLE (Food Web)	All the interconnecting <u>food chains</u> in a <u>community</u> .
FORAGE FISH	Fish, usually smaller prolific species, that are important as food for predatory species.
FREE-SWIMMING (Motile)	Actively moving about in water or capable of moving about in water. (See <u>Sessile</u>)

FRINGING REEF

Large coral mass at the edge of any land mass in tropical seas; it begins at the water's edge and may extend out to a quarter mile.
(See Barrier Reef, Atoll)

GAME FISH
(Sport Fish)

Those species of fish considered to possess sporting qualities on fishing tackle; e.g., salmon, trout, black bass, striped bass, etc. Game fish are usually considered to be more sensitive to environmental changes than rough fish.

GAUSE'S RULE

(Competition-Exclusion Principle)

HABITAT (Biotope)	A specific type of place that is occupied by an <u>organism</u> , a <u>population</u> , or a <u>community</u> .
HABITAT FORM	<u>(Ecotype)</u>
HABITAT NICHE	The specific part or smallest unit of a <u>habitat</u> occupied by an organism. (See <u>Ecological Niche</u>)
HADAL ZONE	Pertaining to that part of the ocean at depths exceeding 6000 meters, including both water and floor or bottom. (See <u>Abyssal Zone</u>)
HERBICIDE	A chemical substance used for killing plants, especially weeds.
HERBIVORE	An <u>organism</u> that feeds on plant material. (See <u>Carnivore</u>)
HETEROGENEOUS	Consisting of dissimilar elements or constituents. (See <u>Homogeneous</u>)
HETEROTROPHIC (Holozoic)	Pertaining to organisms that are dependent on organic material for food. (See <u>Autotrophic</u>)
HIGHER AQUATIC PLANTS (Pond Weeds, Aquatic Vascular Plants)	Those plants composed of complex and differentiated tissues whose seeds germinate in the water phase or <u>substrate</u> of a body of water and which must spend part of their life cycle in water. This grouping includes plants which grow completely <u>submersed</u> as well as a variety of <u>emersed</u> and <u>floating leaf</u> types. (See <u>Macrophyte</u>)

HOLOPHYTIC	<u>(Autotrophic)</u>
HOLOZOIC	<u>(Heterotrophic)</u>
HOMOGENEOUS	Of uniform composition throughout.
HOMOTHERMOUS	Having the same temperature throughout.
HYPOLIMNION	The region of a body of water that extends from the <u>thermocline</u> to the bottom and is essentially removed from major surface influences. (See <u>Epilimnion</u>)

IDENTIFICATION	The use of a taxonomic key or the equivalent to determine the scientific name of an organism.
INCIDENTAL DRIFT	The casual, random drift of organisms. (See <u>Drift Organisms</u> , <u>Catastrophic Drift</u> , <u>Periodic Drift</u>)
INCIPIENT LETHAL LEVEL (ILL)	That concentration of an environmental identity beyond which an organism could no longer survive for an indefinite period of time.
INDICATOR ORGANISMS	A <u>species</u> , whose presence or absence may be characteristic of environmental conditions in a particular area or <u>habitat</u> ; however, species composition and relative abundance of individual components of the <u>population</u> or <u>community</u> are usually considered to be a more reliable index of water quality.
INDIGENOUS	Refers to an organism that is native, not introduced in an area.
INDIRECT TOXICITY	<u>Toxicity</u> that affects organisms by interfering with their food supply or modifying their <u>habitat</u> instead of directly acting on the organisms themselves. (See <u>Direct Toxicity</u>)
INLET	A short, narrow waterway connecting a bay, <u>lagoon</u> , or similar body of water with a large parent body of water; an arm of the sea, or other body of water, that is long compared to its width, and that may extend a considerable distance inland.

INSTAR	A stage in the <u>life cycle</u> of an insect or other arthropod between two successive <u>molts</u> .
INTERACTION	Mutual or reciprocal action or influence between organisms, between organisms and <u>environment</u> , or between environmental factors.
INTERSPECIFIC	Refers to relations or conditions between <u>species</u> . (See <u>Intraspecific</u>)
INTERTIDAL ZONE	(<u>Tidal Zone</u>)
INTOLERANT ORGANISMS	(<u>Sensitive Organisms</u>)
INTRASPECIFIC	Refers to relations or conditions between individuals within a <u>species</u> . (See <u>Interspecific</u>)
INVERSE ESTUARY	Type of <u>estuary</u> in which evaporation exceeds the supply of freshwater; evaporation > freshwater inflow + precipitation. (See <u>Positive Estuary</u> , <u>Neutral Estuary</u>)
INVERTEBRATES	Animals without an internal skeletal structure; e.g., insects, mollusks, crayfish. (See <u>Veterbrate</u>)

LAGOON

1. A shallow sound, pond, or channel near or communicating with a larger body of water.
2. A settling pond for treatment of wastewater.

LARVA

The immature form of an animal which is unlike its parents. Larva are usually self-feeding but must pass through some sort of metamorphosis before assuming the characteristics of the adult; in insects, the wormlike stage between the egg and the pupa.

LAW OF THE MINIMUM,
LIEBIG'S

"The growth and reproduction of an organism is dependent on the nutrient substance, such as oxygen, carbon dioxide, calcium, etc., that is available in minimum quantity." (See Limiting Factor)

LAW OF TOLERANCE,
SHELFORD'S

"When one environmental factor or condition is near the limits of toleration, either minimum or maximum, that one factor or condition will be the controlling one and will determine whether or not a species will be able to maintain itself." (See Limiting Factor)

LENTIC

Pertaining to standing (nonflowing) waters such as lakes, ponds, and swamps. (See Lotic)

LIFE CYCLE

The various phases, changes, or stages through which an individual passes from the fertilized egg to death of the mature organism. (See Metamorphosis)

LIMITING FACTOR	A factor whose absence, or excessive concentration, exerts some restraining influence upon a <u>population</u> through incompatibility with <u>species</u> requirements or <u>tolerance</u> . (See <u>Law of the Minimum</u> , <u>Law of Tolerance</u>)
LIMNETIC ZONE	The open-water region of a lake, especially in areas too deep to support rooted aquatic plants. This region supports <u>plankton</u> and fish as the principal plants and animals. (See <u>Littoral Zone</u>)
LIMNOLOGY	The <u>ecology</u> of fresh waters.
LITTORAL ZONE	The shallow area that extends from shore to the lakeward limit of rooted aquatic plants; the shoreward region of a body of water; in marine <u>ecology</u> , the <u>tidal zone</u> . (See <u>Limnetic Zone</u>)
LOTIC	Pertaining to flowing waters such as streams and rivers. (See <u>Lentic</u>)

MACROORGANISMS Those organisms visible to the unaided eye
(Macroinvertebrates) and which are retained on a U. S. standard
sieve no. 30 (openings of 0.589 mm.). (See
Microorganisms)

MACROPHYTE Any plant that can be seen with the naked,
unaided eye; e.g., aquatic mosses, ferns,
liverworts, rooted plants, etc.

MARL An earthy, unconsolidated deposit formed in
freshwater lakes, chiefly of calcium carbonate
mixed with clay or other impurities in
varying proportions.

MARSH Periodically wet or continually flooded area
with the surface not deeply submerged. Covered
dominantly with emerged aquatic plants; e.g.,
sedges, cattails, rushes.

**MEDIAN TOLERANCE
LIMIT (TL_m)** The concentration of tested substance in
water at which just 50% of the test organisms
survive for a specified period of exposure.
(See Tolerance Limit)

MEROMICTIC LAKES Lakes in which dissolved substances create
a gradient of density differences with depth;
this prevents complete mixing or circulation
of water masses. (See Chemical Stratification)

MEROMIXIS	A condition of permanent <u>stratification</u> of water masses in lakes.
MESOLIMNION	(<u>Thermocline</u>)
METABOLISM	The sum of all chemical processes occurring within an organism; includes both <u>synthesis</u> (<u>anabolism</u>) and breakdown (<u>catabolism</u>) of organic compounds.
METALIMNION	(<u>Thermocline</u>)
METAMORPHOSIS	Abrupt transformation of an animal from one distinctive life history stage to another in its postembryonic development; e.g., <u>larva</u> of an insect to a <u>pupa</u> . (See <u>Life Cycle</u>)
MICROORGANISMS (Microinvertebrates)	Those minute organisms invisible or only barely visible to the unaided eye. Microorganisms pass through a U. S. standard series no. 30 sieve but are retained on a no. 100 sieve (openings of 0.149 mm). (See <u>Macroorganisms</u>)
MOLT	To cast or shed periodically the outer body covering which permits an increase in size. This is especially characteristic of invertebrates. (See <u>Instar</u>)
MOTILE	(<u>Free-Swimming</u>)

NANOPLANKTON	Very minute <u>plankton</u> not retained in a plankton net equipped with no. 25 silk bolting cloth (mesh, 0.03 to 0.04 mm.).
NATIVE SPECIES	A species that is part of an area's original biota.
NATURAL SELECTION	Processes occurring in nature which result in survival of the fittest and elimination of individuals less well adapted to their <u>environment</u> .
NAUPLIUS	<u>Free-swimming</u> microscopic larval stage characteristic of many crustaceans, barnacles, etc.
NEAP TIDES	Exceptionally low <u>tides</u> which occur twice each month when the earth, sun and moon are at right angles to each other; these usually occur during the moon's first and third quarters. (See <u>Spring Tides</u>)
NEKTON	Macroscopic organisms swimming actively in water; e.g., fish. (See <u>Plankton</u>)
NERITIC ZONE	Relatively shallow water zone which extends from the high-tide mark to the edge of the <u>continental shelf</u> .
NET PLANKTON	<u>Plankton</u> retained in a plankton net equipped with no. 25 silk bolting cloth (mesh, 0.03 to 0.04 mm.).

NEUSTON	Organisms associated with, or dependent upon, the surface film (air-water interface) of bodies of water.
NEUTRAL ESTUARY	Type of <u>estuary</u> in which neither the freshwater inflow nor the evaporation predominates; freshwater inflow + precipitation = evaporation. (See <u>Positive Estuary</u> , <u>Inverse Estuary</u>)
NICHE	(See <u>Ecological Niche</u> , <u>Habitat Niche</u>)
NOCTURNAL	Pertaining to those organisms that are active at night. (See <u>Diurnal</u>)
NUISANCE ORGANISMS (Pests)	Those organisms capable of interfering with the use or treatment of water.
NUTRIENTS	Elements, or compounds, essential as raw materials for organism growth and development; e.g., carbon, oxygen, nitrogen, phosphorus, etc.
NYMPH	An immature developmental form characteristic of the pre-adult stage in insects that do not have a <u>pupal</u> stage; e.g., mayflies and stoneflies. (See <u>Larva</u>)

OBLIGATE	Limited to one mode of life or action. (See <u>Facultative</u>)
OCEANIC ZONE	The region of open ocean beyond the <u>continental shelf</u> .
OLIGOTROPHIC LAKES	Deep lakes which have a low supply of <u>nutrients</u> , thus they support very little organic <u>production</u> . Dissolved oxygen is present at or near saturation throughout the lake during all seasons of the year. (See <u>Eutrophic Lakes</u>)
OMNIVOROUS	Feeding on both plant and animal tissue. (See <u>Herbivorous</u> , <u>Carnivorous</u>)
OPTIMUM LEVEL	The most suitable degree of an environmental factor for the full development of the organism concerned. (See <u>Tolerance Range</u>)
ORGANISM	Any living individual.
OSMOREGULATION	The adjustment in the osmotic concentration of solutes in body fluids in organisms to environmental conditions; e.g., when salmon migrate from salt to freshwater.
OVERTURN (Turnover)	The period of mixing, by top to bottom circulation, of previously stratified water masses. This phenomenon may occur in spring and/or fall; the result is a uniformity of physical and chemical properties of the water at all depths. (See <u>Thermal Stratification</u> , <u>Chemical Stratification</u> , <u>Spring Overturn</u> , <u>Fall Overturn</u>)

OXYGEN DEBT	A temporary phenomenon that occurs in an <u>organism</u> when available oxygen is inadequate to supply the respiratory demand. During such a period the metabolic processes result in the accumulation of breakdown products that are not oxidized until sufficient oxygen becomes available.
OXYGEN DEFICIT	The difference between observed oxygen concentration and the amount that would theoretically be present at 100% saturation for existing conditions of temperature and pressure.

PARASITE	An organism that lives on or in a host organism during all or part of its existence. Nourishment is obtained at the expense of the host.
PATHOGEN	An organism or virus that causes a disease.
PELAGIC ZONE	The open sea, away from the shore. Comparable with the <u>limnetic zone</u> of lakes.
PERIODIC DRIFT	Drift of bottom organisms at regular or predictable intervals such as <u>diurnal</u> , seasonal, etc. (See <u>Drift Organisms</u> , <u>Catastrophic Drift</u> , <u>Incidental Drift</u>)
PERIPHYTON (Aufwuchs)	Attached microscopic organisms growing on the bottom, or other submersed <u>substrates</u> , in a waterway.
PESTICIDE	Any chemical preparation used to kill <u>pests</u> . Includes insecticides, herbicides, fungicides, etc.
PESTS	(<u>Nuisance Organisms</u>)
PHOTOSYNTHESIS	The metabolic process by which simple sugars are manufactured from carbon dioxide and water by plant cells using light as an energy source. (See <u>Chlorophyll</u>)
PHOTIC ZONE	(<u>Euphotic Zone</u>)

PHYTOPLANKTON	The plants of the <u>plankton</u> . Unattached microscopic plants subject to movement by wave or current action. (See <u>Zooplankton</u>)
PLANKTON	Suspended <u>microorganisms</u> that have relatively low powers of locomotion, or that drift in the water subject to the action of waves and currents. (See <u>Benthos</u> , <u>Periphyton</u> , <u>Nekton</u>)
POND WEEDS	(<u>Higher Aquatic Plants</u>)
POOLS	Areas of a stream, where the velocity of current is reduced. The reduced velocity provides a favorable <u>habitat</u> for <u>plankton</u> . Silts and other loose materials that settle to the bottom of pools are favorable for burrowing forms of <u>benthos</u> . (See <u>Riffle</u>)
POPULATION	A group of interacting individuals of the same <u>species</u> , <u>area</u> , or <u>community</u> .
POSITIVE ESTUARY	Coastal indentures in which there is a measurable dilution of sea water by land drainage; freshwater inflow + precipitation > evaporation. (See <u>Inverse Estuary</u> , <u>Neutral Estuary</u>)
POTAMON ZONE	Stream reach at lower elevations characterized by reduced flow, higher temperature, and lower dissolved oxygen levels. (See <u>Rithron Zone</u>)

PREDATOR	An animal that kills and consumes other animals. (See <u>Prey</u>)
PREDOMINANT	Those organisms that are of outstanding abundance in a particular <u>community</u> for a given period of time. (See <u>Dominant</u>)
PREY	An animal that is killed and consumed by another animal. (See <u>Predator</u>)
PRIMARY PRODUCTIVITY	The total quantity of <u>protoplasm</u> produced by <u>autotrophic</u> organisms per unit of time in a specified <u>habitat</u> .
PRODUCERS	Organisms that synthesize organic material from inorganic substances; e.g., plants. (See <u>Consumers</u> , <u>Reducers</u>)
PRODUCTION	The process of producing organic material; the quantity produced.
PRODUCTIVITY	<ol style="list-style-type: none">1. Rate of <u>protoplasm</u> formation or energy utilization by one or more <u>organisms</u>; total quantity of organic material produced within a given period in a specified <u>habitat</u>.2. Capacity or ability of an environmental unit to produce organic material. (See <u>Primary Productivity</u>, <u>Secondary Productivity</u>)

PROFOUND ZONE	The deep, bottom-water area beyond the depth of effective light penetration. All of the lake floor beneath the <u>hypolimnion</u> .
PROLIFIC	Pertaining to organisms that have a high reproduction rate and normally produce large numbers of young.
PROTOPLASM	The living material in cells of plants and animals.
PUPA	An intermediate, usually <u>quiescent</u> , form following the larval stage in insects, and maintained until <u>metamorphosis</u> to the adult stage. (See <u>Larva</u>)

QUALITY

A term to describe the composite chemical, physical, and biological characteristics of a water with respect to its suitability for a particular use.

QUIESCENT

Refers to the temporary cessation of development, movement or other activity. (See Pupa)

RAPIDS	Areas of a stream where velocity of current is great enough to keep the bottom clear of all loose materials, thus providing a firm <u>substrate</u> . The surface of the water is disrupted by turbulent currents. This area is occupied largely by specialized benthic or periphytic organisms that can firmly attach or cling to a firm <u>substrate</u> . (See <u>Pools</u> , <u>Riffles</u>)
RED TIDE	A visible red-to-orange coloration of an area of the sea caused by the presence of a <u>bloom</u> of certain <u>plankton</u> . These blooms are often the cause of major fish kills.
REDD	A type of fish spawning area associated with flowing water and clean gravel. Fishes that utilize this type of spawning area include trout, salmon, some minnows, etc.
REDUCERS (Decomposers)	Those organisms, usually bacteria or fungi, that break down complex organic material into simpler compounds. (See <u>Producers</u> , <u>Consumers</u>)
REEF	A ridge of rocks, sand, soil or <u>coral</u> projecting from the bottom to or near the surface of the water.
RESPIRATION	The complex series of chemical and physical reactions in all living organisms by which the energy and <u>nutrients</u> in foods is made available for use. Oxygen is used and carbon dioxide released during this process. (See <u>Metabolism</u>)

RIFFLES	A shallow <u>rapids</u> in an open stream where the water surface is broken into waves by wholly or partly submerged obstructions. Riffles usually support a wider variety of bottom organisms than other stream sections. (See <u>Pools</u>)
RITHRON ZONE	Stream reach at higher elevations characterized by rapid flow, low temperature, and high dissolved oxygen levels. (See <u>Potamon Zone</u>)
ROUGH FISH	Those species of fish considered to be of poor fighting quality when taken on tackle; e.g., carp, gar, suckers, etc. These fish are considered undesirable in most situations. Most species in the group are more tolerant of widely changing environmental conditions than <u>game fish</u> .

SALT MARSH	Low area adjacent to the sea that is covered with salt tolerant vegetation and regularly flooded by high tide; similar inland areas near saline springs or lakes, though not regularly flooded.
SAPROBIC	Living on dead or decaying organic matter. (See <u>Scavenger</u>)
SAPROBICITY	The sum of all metabolic processes which are the direct opposite of <u>primary production</u> ; can be measured either by the dynamics of <u>metabolism</u> or analysis of <u>community structure</u> .
SAPROBIENSYSTEM	European system of classifying organisms according to their response to organic pollution in slow moving streams. <ol style="list-style-type: none">1. <u>Alpha-Mesosaprobic Zone</u> - Area of active decomposition, partly <u>aerobic</u>, partly <u>anaerobic</u>, in a stream heavily polluted with organic wastes.2. <u>Beta-Mesosaprobic Zone</u> - That reach of a stream that is moderately polluted with organic wastes.3. <u>Oligosaprobic Zone</u> - That reach of a stream that is slightly polluted with organic wastes and contains the mineralized products of self-purification from organic pollution, but with none of the organic pollution remaining.

4. Polysaprobic Zone - That area of a grossly polluted stream which contains the complex organic wastes that are decomposing primarily by anaerobic processes.

SCAVENGER

An organism that consumes decomposing organic matter.

SECONDARY PRODUCTIVITY

Total quantity of animal (and other heterotrophic) protoplasm produced per unit of time in a specified habitat. (See Primary Productivity, Productivity)

SEICHE

Periodic oscillations in the water level of a lake or other landlocked body of water due to unequal atmospheric pressure, wind, or other cause, which sets the surface in motion. These oscillations take place when a temporary local depression or elevation of the water level occurs.

SENSITIVE ORGANISMS
(Intolerant Organisms)

Organisms that exhibit a rapid response to environmental changes and are killed, driven out of the area, or as a group are substantially reduced in numbers when their environment is fouled. (See Tolerant Association)

SESSILE

Pertaining to those organisms that are attached to a substrate and not free to move about; e.g., periphyton. (See Free-Swimming)

SESTON	All material, both organic and inorganic, suspended in a waterway. Bioseston is the living material; abioseston is the non-living portion.
SLUDGE DEPOSITS	Accumulations of settled, usually rapidly decomposing, organic material in the aquatic system. A deposit of solids of wastewater origin.
SLIMES	Substances of viscous organic nature, usually formed from microbiological growth.
SLUDGEWORMS	Aquatic segmented worms (class - Oligochaeta) that exhibit marked <u>population</u> increases in waters polluted with decomposable organic wastes. (See <u>Bloodworms</u>)
SPAWN	<ol style="list-style-type: none">1. In aquatic animals, to produce or deposit eggs or sperm.2. To produce eggs or young.3. Eggs of fishes and higher aquatic invertebrates.
SPECIES (Both singular and plural)	An <u>organism</u> or organisms forming a natural population, or groups of <u>populations</u> , that transmit specific characteristics from parent to offspring. Each species is reproductively isolated from other populations with which they might breed. Hybrids, the results of interbreeding, usually exhibit a loss of fertility.

SPORT FISH

(Game Fish)

SPRING OVERTURN

A physical phenomenon that may take place in a body of water during the early spring. The sequence of events leading to spring overturn include: (1) melting of ice cover, (2) warming of surface waters, (3) density changes in surface waters producing convection currents from top to bottom, (4) circulation of the total water volume by wind action, and (5) vertical temperature equality. The overturn results in a uniformity of the physical and chemical properties of the entire water mass. (See Fall Overturn, Overtur)

SPRING TIDE

Exceptionally high tide which occurs twice per lunar month when there is a new or full moon, and the earth, sun, and moon are in a straight line. (See Neap Tides)

STANDARD

(Water Quality Standard)

STANDING CROP

The quantity of living organisms present in an environment at a selected point in time.

STENO-

Prefix denoting a narrow range of tolerance of an organism to a specific environmental factor; e.g., stenothermal refers to temperature; stenohaline refers to salinity; etc. (See Eury-)

STIMULUS

An influence that causes a response in an organism. (See Taxis)

STRATIFICATION (Density Stratification)	Arrangement of water masses into separate, distinct, horizontal layers as a result of differences in density; may be caused by differences in temperature, dissolved or suspended solids. (See <u>Thermal Stratification</u> , <u>Chemical Stratification</u>)
STRESS	The conditions resulting from any environmental change that disturbs the normal functioning of an animal to such an extent that its chances for survival are reduced.
SUBLITTORAL ZONE	The part of the shore from the lowest water level to the lower boundary of plant growth; transition zone from the <u>littoral</u> to <u>profundal</u> bottom.
SUBMERSED (Submerged) AQUATIC PLANTS	<u>Higher aquatic plants</u> that grow, or are adapted to grow, beneath the surface of the water; e.g., pondweed, coontail, etc.
SUBSTRATE	The bottom material of a waterway; the base or substance upon which an organism is growing; a substance undergoing oxidation.
SUMMER KILL	Complete or partial kill of a fish population in ponds or lakes during the warm months; variously produced by excessively warm water, by a depletion of dissolved oxygen, and by the release of toxic substances from a decaying algal bloom, or by a combination of these factors. (See <u>Winter Kill</u>)

SUPRALITTORAL ZONE
(Supratidal Zone) The portion of the seashore adjacent to the tidal or spray zone.

SURFACE AQUATIC
PLANTS (Floating Aquatic Plants)

SYMBIOSIS Two organisms of different species living in close association, one or both of which may benefit and neither is harmed. Such a phenomenon is found among organisms in biological treatment processes.

SYNERGISM The joint action of two or more substances is greater than the sum of the action of each of the individual substances; e.g., action of certain combinations of toxicants. The improvement in performance achieved because two agents are working together. (See Antagonism)

SYNTHESIS The production of a substance by the union of elements or simpler chemical compounds.

SYSTEMATICS (Taxonomy)

TAXIS	Directed movement by an organism in response to a <u>stimulus</u> ; e.g., phototaxis is directed movement in response to a light stimulus; thermotaxis is directed movement in response to heat or cold as a stimulus; etc.
TAXON (Taxa)	A "kind" of <u>organism</u> .. Any taxonomic unit or category of organisms; e.g., species, genus, family, order, etc.
TAXONOMY (Systematics)	Organism <u>classification</u> with reference to their precise relationship in the plant or animal kingdom; includes the bases, principles, procedures and rules of classification.
TERRESTRIAL	Growing, living, or peculair to the land, as opposed to the aquatic environment.
TERRITORY	The area which an animal defends against intruders.
THERMAL STRATIFICATION	The layering of water masses owing to different densities in response to temperature. The condition of a body of water in which the successive horizontal layers have different temperatures, each layer more or less sharply differentiated from the adjacent ones, the warmest (or the coldest) at the top. (See <u>Overtur</u> n)

THERMOCLINE (Mesolimnion, Metalimnion)	The transition zone between the warm <u>epilimnion</u> and cold <u>hypolimnion</u> of stratified bodies of water; temperature change equals or exceeds 1°C for each meter of depth. (See <u>Thermal Stratification</u>)
THRESHOLD (Critical Level)	The maximum or minimum duration or intensity of a <u>stimulus</u> that is required to produce a response in an organism.
TIDAL FLAT	The sea bottom, usually wide, flat, muddy and nonproductive, which is exposed at low tide. A marshy or muddy area that is covered and uncovered by the rise and fall of the tide.
TIDAL MARSH	A low, flat marshland that is traversed by interlacing channels and tidal sloughs; periodically inundated by high tides; vegetation consists of rushes, grasses, and other salt tolerant plants.
TIDAL ZONE (Eulittoral Zone, Intertidal Zone)	The area of a shore between the limits of water level fluctuation; the area between the levels of high and low <u>tides</u> .
TIDE	The alternate rising and falling of water levels, twice in each lunar day, due to gravitational attraction of the moon and sun in conjunction with the earth's rotational force.
TL _m (TL ₅₀)	(<u>Median Tolerance Limit</u>)

TOLERANCE	Relative capability of an organism to endure or adapt to an unfavorable environmental factor.
TOLERANCE LIMIT ($TL_{10\dots 100}$)	The concentration of a substance which some specified portion of an experimental <u>population</u> can endure for a specified period of time with reference to a specified type of response; e.g., TL_{100} means that all test organisms endured the stress for the specified time; TL_{10} means only 10% of the test organisms could tolerate the imposed stress for the specified time. (See <u>Median Tolerance Limit</u>)
TOLERANCE RANGE	The range of one or more environmental conditions within which an organism can function; range between the highest and lowest value of a particular environmental factor in which an organism can live.
TOLERANT ASSOCIATION	An <u>association</u> of organisms capable of withstanding adverse conditions within the <u>habitat</u> . This association is often characterized by a reduction in the number of species (from a <u>clean water association</u>) and, in the case of organic pollution, an increase in individuals representing certain species.
TOXICANT	A substance that through its chemical or physical action kills, injures, or impairs an organism; any environmental factor which, when altered, produces a harmful biological effect. (See <u>Pesticide</u>)

TOXICITY	Quality, state or degree of the harmful effect resulting from alteration of an environmental factor.
TRIPTON	The dead suspended particulate matter in aquatic habitats; the nonliving portion of the <u>seston</u> .
TROPHIC LEVEL	One of the parts in a nutritive series in an <u>ecosystem</u> in which a group of organisms in a certain stage in the <u>food chain</u> secures food in the same general manner. The first or lowest trophic level consists of <u>producers</u> (green plants); the second level of <u>herbivores</u> ; the third level of secondary <u>carnivores</u> . Most bacteria and fungi are organisms in the <u>reducer (decomposer)</u> trophic level.
TROPHOGENIC REGION	The area of a body of water where organic production from mineral substances takes place on the basis of light energy and photosynthetic activity.
TROPHOLYTIC REGION	The deep area of a body of water where organic breakdown predominates because of light deficiency.
TURNOVER	(<u>Overtur</u>)

UBIQUITOUS ORGANISMS	Organisms that can tolerate a wide range of environmental conditions or variation; organisms that are so active or numerous as to seem to be present or existent in all types of environments. (See <u>Tolerant Association</u> , <u>Sensitive Organisms</u>)
UNICELLULAR	Refers to an organism that consists of only one cell; e.g., blue green algae, protozoa, bacteria. These organisms may, however, be filamentous or colonial in form.

V - /

VERTEBRATES

Animals that have an internal skeletal system. (See Invertebrate)

WATER POLLUTION	Alteration of the aquatic environment in such a way as to interfere with a designated beneficial use.
WATER QUALITY CRITERIA	"A scientific requirement on which a decision or judgement may be based concerning the suitability of water quality to support a designated use." (See <u>Water Quality Standard</u>)
WATER QUALITY STANDARD	"A plan that is established by governmental authority as a program for water pollution prevention and abatement." (See <u>Water Quality Criteria</u>)
WINTER KILL	The death of fishes in a body of water during a prolonged period of ice and snow cover; caused by oxygen exhaustion due to respiration and lack of photosynthesis. (See <u>Summer Kill</u>)

ZONE	An area characterized by similar <u>flora</u> or <u>fauna</u> ; a belt or area to which certain species are limited.
ZOOPLANKTON	The animals of the <u>plankton</u> . Unattached microscopic animals having minimal capability for locomotion.

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